

Invest in Foliar Analysis - It Pays Dividends

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Foliar Analysis, a relatively new technique in floriculture for determining the amounts and levels of nutrients within carnations is a real asset to carnation growers. Studies on Long Island bore this out during the 1967-68 growing season.

Since the introduction of Foliar Analysis in 1965 in New York State many carnation growers have used this as another tool in their cultural program to overcome difficulties which could arise from either low or high levels of nutrients accumulated within carnation plants. Coupled with a soil testing program, proper interpretation of foliar and soil test results can overcome many nutrient problems which develop in carnations.

Long Island Studies

In the early spring of 1967 Long Island carnation growers were approached and offered participation in a Foliar Analysis program. Approximately 12 growers wished to cooperate.

The soil fertility programs of each grower were carefully studied and suggestions were made to each if improvements were necessary. Some growers already had excellent fertility programs and others left a lot to be desired. In most cases some suggestions were made for improvement.

Each of the growers were visited by Cooperative Extension and taught how to take soil and leaf samples. Following this, all test boxes and foliar analysis kits were mailed once per month to the growers with instructions that upon receipt of the boxes or kits the samples were due to be taken.

The procedure used for the program was as follows:

1. Soil test taken four weeks prior to planting and fertilizer adjustments made based on the results.
2. Four weeks following planting soil test taken.
3. Two months after planting and every two months thereafter through May 1968 a Foliar Analysis and soil test taken.
4. Three months following planting and every two months thereafter through June soil test taken.
5. All soil test and Foliar Analysis results were studied by Prof. James W. Boodley, Cornell University and myself with recommendations made to growers. Additional comments and recommendations were made in certain localized situations.

Results

One of the first things noted in the beginning of the

study was the need for many growers to increase the amount of fertilizer they were applying to their crops. Once this was accomplished few general nutrient problems resulted. There were, however, a few specific problems which arose. These dealt with Boron, Magnesium, Nitrogen and Potassium which are interesting to note. They also point out how important a role Foliar Analysis can play in any growers' cultural program.

Boron

After a couple of months of leaf analysis it became apparent some growers' plants were approaching the critical or near critical level of Boron (Figure 1). The carnations of grower A went below the critical level of 25 parts per million in January. Grower C experienced a near critical level in November. Each of these made applications of Boron following knowledge of the problem. As illustrated in Figure 1 a recovery of Boron to normal levels (25-100 parts per million) occurred following applications.

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Foliar Analysis

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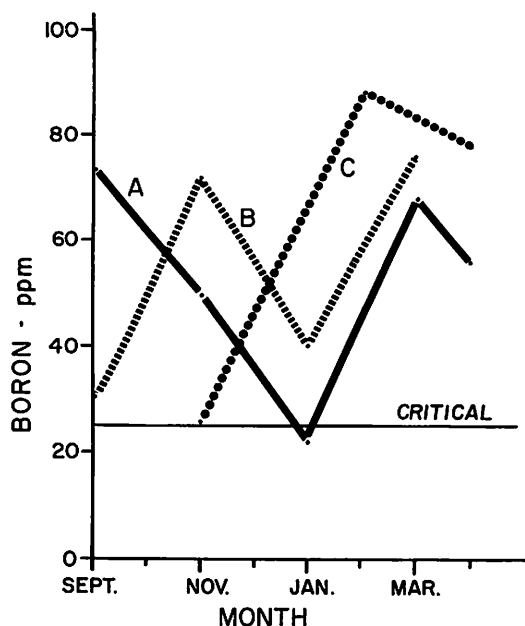


FIGURE 1. Boron content of carnations from three growers using Foliar Analysis between September and March, 1967-68 growing season.

Grower B was one grower with a fairly sophisticated fertility program. He soil tested regularly prior to the introduction of Foliar Analysis. He also mixed Boron in his fertilizer stock solutions which was applied at every watering along with the major nutrients. He made a supplemental application of Boron in September, recovered from the problem and approached the critical level again in January along with grower A. Apparently he was not applying enough Boron to keep him in the safe range. In the future this grower can increase the Boron content in the stock solution in August and December since he knows these are the two problems for him.

In September when the first occurrence of his Boron problem was noted if Grower B had not made supplemental applications of Boron to his crop he probably would have experienced visual Boron deficiency symptoms in November, December or January.

If visual symptoms of Boron deficiency occurred the entire crop would have had a very high percentage of split blooms, malformed flowers, branches with the witches broom effect, splitting of leaves at the nodes, shoots growing through the split leaves, and a definite reduction in production and quality. If the crop had been allowed to reach this point it probably wouldn't recover to normal growth and production. It would very definitely cause a serious financial set-back to the grower.

On the basis of these results, as a preventative measure in future years, A and B should make application of Boron in December to avoid approaching the critical levels of 25 parts per million if their fertility programs remain the same.

Magnesium

Magnesium, one of the minor elements and very important in the make up of chlorophyll, the green coloring matter in plants is an element we are generally not too concerned about. Usually, incorporation of Dolomitic (Magnesium) Limestone into the soil prior to planting is sufficient to maintain adequate levels from planting until the crop is removed. In one particular case, Grower D almost had a Magnesium problem.

Figure 2 illustrates exactly what happened with Magnesium following planting of his crop. Between September and January the availability of Magnesium increased to its maximum point of 0.27 percent within the plant tissue. Foliar Analysis tests in February indicated Magnesium was approaching the critical level of 0.15 percent in the leaf tissue. Based on recommendations an application of Epsom Salts (Magnesium Sulfate) was applied to the soil in February and as noted the Magnesium level began to increase again.

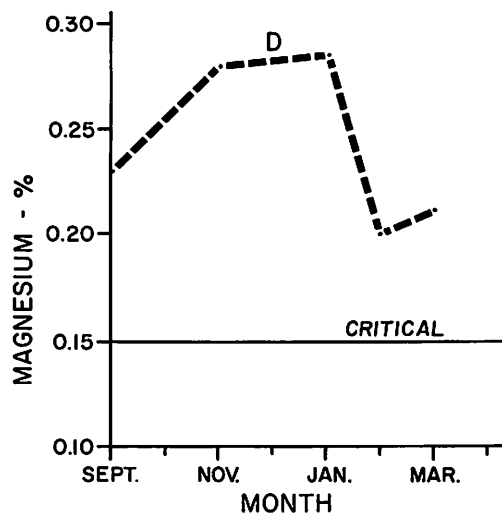


FIGURE 2. Magnesium content of carnations from one grower using Foliar Analysis between September and March, 1967-68 growing season.

Thanks to Foliar Analysis this grower was able to avoid a serious Magnesium deficiency problem.

Nitrogen and Potassium

A couple of growers had similar experiences with Nitrogen and Potassium. The levels within the plant tissue decreased below the critical point but with liberal applications of Nitrogen and Potash the levels recovered to the normal range again before a serious set-back to the crop had occurred.

What Does Foliar Analysis Do?

As illustrated above and in Figures 1 and 2 Foliar Analysis gives nutrient trends. The values are relatively stable when compared with the values received from soil testing. In the soil solution there are many sudden temporary changes which occur and are often reflected by soil testing. These are due to the result of heavy applications of fertilizer for corrective measures and also from heavy applications of fertilizers if fertilizing is accomplished on a weekly or bi-weekly schedule.

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Foliar Analysis

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The values received from Foliar Analysis over a period of time do not change suddenly but gradually. This gradual increase or decrease is advantageous and useful to growers. For example, if you as a grower were to plot each value for each nutrient on a graph from each Foliar Analysis report as illustrated in Figures 1 and 2 along with the critical level one could readily see if trouble is developing. If you noted the plotted points approaching the critical point similar to what occurs in Figures 1 and 2, corrective applications needed to overcome a deficiency problem could be made before the plants began to suffer.

Also, past records could be a guide as to when to apply materials on a preventative basis to avoid future problems. One must, however, be aware in certain seasons a different level of nutrients are required than at other seasons. Two excellent examples of this are with the elements Nitrogen and Potassium. This is well described and illustrated in New York State Flower Growers Bulletin 230 (1) and elsewhere (2).

Conclusions

Foliar Analysis is definitely a very important tool available to carnation growers. By using this technique of determining the amounts of nutrients accumulated by carnation plants, plus a soil testing program one could develop a very sophisticated and efficient fertility program. Carnations are not a crop which can be neglected fertility-wise. They must have adequate amounts of nutrients available to them at all times for proper growth and development. If you are a carnation grower why not make an investment in Foliar Analysis? Your dividends will be many times the amount you invest. If you don't believe it think of what could have happened if grower A, B, or C experienced a severe case of Boron deficiency!

Literature Cited

1. Nelson, P. V. and J. W. Boodley. 1965. Foliar Analysis of carnations—Part III: Development of standard tissue concentrations. New York State Flower Growers Bulletin 230:1-4.
 2. Nelson, P. V. and J. W. Boodley. 1965. Development of a set of standard leaf composition values for carnation. Proc. Amer. Soc. Hort. Sci. 86:641-649.
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